

Osteopathy in the Complex Treatment and Rehabilitation of Patients with Persistent Pain Syndrome in Chronic Dorsalgia

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ABSTRACT

The present study focuses on treatment and rehabilitation of patients with persistent pain syndrome in chronic dorsalgia and gives a brief review of Russian and foreign literature and experimental research on the problem. There is evidence that chronic pain is often persistent and has a significant impact on the patient's psychoemotional state and, as a result, on their quality of life.

The main approaches to the treatment of this pathology are considered, and the analysis of the main methods of treatment is presented. Notably, the prevailing methods of therapy at the present stage often have a short-term effect and side effect. The necessity of further scientific research of the most effective method of treatment and rehabilitation of patients with persistent pain syndrome is determined. The fact that osteopathic methods in the complex treatment of persistent back pain increase the effectiveness of treatment and rehabilitation is proved, and conclusions and recommendations are formulated based on the obtained data.

KEYWORDS

Persistent Pain Syndrome in Chronic Dorsalgia, Pain Symptom, Pathology, Chronic Dorsalgia, Treatment Method, Musculoskeletal System, Osteopathy in Complex Treatment and Rehabilitation, Myofascial Pain Syndrome, Osteopathic Medicine.

Introduction

The problem of persistent pain in chronic dorsalgia has remained extremely relevant for several decades. Pain is one of the leading factors worldwide for a decrease in a person's ability to work and deterioration in their quality of life [5, 11, 30, 33, 37]. The massive negative impact of pain on all-round aspects of life contributed to the creation of the International Association for the Study of Pain, the main task of which is to find optimal solutions in the treatment of pain syndromes [23]. Dorsopathies (chronic back pain) are a stumbling block in the practice of doctors of various specialties (neurologists, orthopedists, surgeons, etc.) today.

Dorsopathies are rightfully referred to as permanent medical and social problems [3, 25]. Musculoskeletal pain is a source of suffering and social loss for millions of people, one of the most frequent causes of short-term or permanent disability and a serious burden for the state and society, forced to spend huge amounts of money on diagnostics, treatment and maintenance of patients [7, 17, 28, 51].

Assessing these conditions as a disease inherent in modern society is highly relevant due to their prevalence and, as a rule, to the prolonged course of the vertebrogenic process often leading to disability. Therapeutic resistance is an extremely unpleasant characteristic of such vertebrogenic syndromes [1].

Chronic back pain is the most common symptom associated with pathology of the musculoskeletal system [27, 29, 63, 67]. Musculoskeletal pain is extremely common and accounts for about more than a third of all acute and chronic pain syndromes [7, 14].

At the same time, pain syndrome in 1/3 of patients is further transformed into chronic dorsalgia of varying duration due to the involvement of the psychogenic and neuropathic links of pathogenesis [13, 66, 68].

In the XX century, researchers noted that society faces significant economic losses due to the disability of persons suffering from persistent pain syndrome [45].

Dorsopathies have been declared a priority by the World Health Organization (WHO) for the next five years. The WHO website (November 26, 2019) notes: "Diseases of the musculoskeletal system are the leading factor in disability worldwide. They account for the largest proportion of cases of chronic pain syndrome of non-oncological origin" [6].

At the same time, according to official statistics, in Russia the overall dynamics of diseases of the musculoskeletal system increased significantly since the end of the XX century.

The data of the Ministry of Health of Russia, Rospotrebnadzor and Rosstat on the incidence of the population by the diseases of the musculoskeletal system and connective tissue, presented in the collection 'Healthcare of Russia, 2019', indicate that the pathology of the musculoskeletal system remains stably high for a number of years.

In 2018, diseases of the musculoskeletal system and connective tissue were registered in the Russian Federation in 18306.2 thousand patients, including 4382.4 thousand with a diagnosis established for the first time in their life [22].

The most frequent and sometimes the only pronounced symptom of the musculoskeletal system pathology is pain which often becomes stable.

Due to the high prevalence of pathology, modern classifications (DSM-IV, ICD-10) allocate a special heading 'Dorsalgia (M54).

The Russian Interregional Society for the Study of Pain notes in the Clinical Guidelines for the Treatment of Musculoskeletal Pain (2016) that effective control of acute or recurrent pain can significantly reduce the likelihood of chronic pain formation. Therefore, great importance is attached to the effective treatment of acute pain: it must

be active and based on the principle of pathogenetic action. At the same time, the Guidelines note that “In Russia, until now, an ‘empirical’ approach to analgesic therapy is used – some doctors limit therapy to one type of analgesics, while others immediately prescribe a set of drugs, including non-steroidal anti-inflammatory drugs, muscle relaxants, ‘chondroprotectors’, local administration of glucocorticoids and hyaluronic acid, etc. Such tactics, on the one hand, can lead to inefficiency, and on the other, to unjustified costs and an increased risk of drug complications”.

In this regard, the treatment and medical rehabilitation of patients with persistent pain syndrome in chronic dorsalgia remains an urgent problem for various medical specialists, which necessitates the use of alternative methods of therapy and rehabilitation.

According to the data of Russian and foreign studies, to date, non-traditional methods of treatment such as osteopathy, acupuncture pressotherapy, collateral meridian therapy and gua sha therapy and acupressure demonstrate significant effectiveness in the treatment of patients with pathology of the musculoskeletal system, including in patients with back pain [40, 56, 60].

Osteopathy occupies an important place in the complex treatment of persistent pain syndromes of various localizations. By exerting a powerful reflex effect on tissues, connected by nerves with the spinal motion segments, osteopathy contributes to the elimination of pain syndrome and neurological disorders [38, 41, 42, 54, 55, 56].

The use of classical osteopathic techniques is a logical and reasonable step in the complex treatment of patients with persistent pain syndrome in chronic dorsalgia, since osteopaths use a two-phase approach using osteopathic thinking models [42].

Osteopathic methods based on the relationship between structure and function in the human body comply with the principle of medical rehabilitation of such patients, which should include both the activation of antinociceptive systems and the correction of peripheral sources of pain, which is a solution to the problems of medical rehabilitation of these patients.

Materials and Methods

Study type: Prospective controlled randomized trial.

The study involved 115 people with persistent pain syndrome in chronic dorsalgia, meeting the ICD-10 criteria. The average age of the patients was 48.2±11.9 (21-73 years old); 83.5% female (96 patients), 16.5% male (19 patients).

Persistent pain syndrome in chronic dorsalgia occurred in all the studied patients for an average of 6.5 years, leading to such emotional experience as an increase in the anxiety for their health. Russian and foreign authors find this natural in view of the interpretation of pain as a threat [8, 12, 21, 33].

At the time of examination, all the patients complained of persistent back pain: 67 patients (58%) had pain in the cervical spine, and only 12 people (1/5 cases) had neck pain clearly lateralized. 17 people (15% of the entire sample) had pain in the thoracic spine; moreover, it was 3 times more common in men (11.5% of women and 32% of men).

Lumbar pain was noted by 49 people (43%), and was significantly more often right-sided than left-sided – 23 people (47%) to 8 people (16%). Pain in the entire right or left side of the back was noted by 15 people (13%), only women. 8 people (7%) noted constant pain in all parts of the spine. Distinctive signs of persistent back pain were: non-compliance of the pain zone with the traditional topography of vertebral neurological syndromes, localization of neurological symptoms (in the entire right or left side of the back, in the entire limb), severe pain, with a correspondence between the severity of the pain syndrome and limited mobility of the spine.

To establish the pathophysiological substrate of the pain syndrome, X-rays of the spine were performed using standard techniques in frontal and lateral projections in combination with functional tests and classical osteopathic diagnostics [15, 31, 37, 39, 44, 48, 57, 61, 70].

All the patients were divided by simple randomization into the main (85 people) and control (30 people) groups comparable in age, sex and clinical manifestations and based on voluntary informed consent of a study and specific types and methods of therapeutic measures and taking into account the indications and contraindications to the applied types of therapy.

Patients in the control group, in accordance with the individual clinical picture, were prescribed a traditional pharmacotherapy regimen, including analgesics and non-steroidal anti-inflammatory drugs, antidepressants [14, 17, 18, 19, 20, 23, 26, 27], sessions of autogenous training and physiotherapy exercises.

The treatment regimen for patients of the main group additionally included treatment with osteopathic methods, which were also used based on diagnostics of lymphodynamic and pathobiomechanical disorders and were aimed at restoring the optimal static and dynamic stereotype, taking into account the basic principles of osteopathy and the theory of muscle chains [4, 34, 36, 53, 54, 61].

The osteopathic techniques used by the authors of the present study corresponded to the basic principles of osteopathy described by Russian and foreign authors [10, 16, 53, 57, 68].

Osteopathic treatment was carried out using classical osteopathic techniques described in [10, 16, 17, 19, 27, 34] and others: trust techniques, techniques for balancing ligamentous tensions, general balancing techniques, techniques for balancing the dura mater, release of the upper aperture of the chest, cranial techniques, oscillatory and other techniques.

Patients in the control group received appropriate complex treatment according to the traditional schemes without using osteopathic methods. Control studies of all the listed methods were carried out before treatment and after 1.5 months from the start of therapy at the end of treatment.

To assess the effectiveness of therapy in both groups of patients before and after the course of rehabilitation, osteopathic techniques, inventories and instrumental diagnostic methods were used which have proven themselves over several decades as effective research tools [9].

The study used: VAS (visual analogue scale) (1974), the McGill pain inventory (1990), Spielberger's State-Trait Anxiety Inventory (STAI) (1970) modified by Yu.L. Khanin (1976), the Beck depression inventory (1961), Wellbeing-Activity-

Mood inventory (1973), and the MOS SF-36 inventory (1998).

The influence of osteopathic techniques on changes in cerebral hemodynamics was investigated according to the severity of microcirculatory disorders in the conjunctiva of the eyeball by photographing the temporal part of the conjunctiva obtained using a SL-2B slit lamp with a magnification of 20 times, a digital camera and a computer.

In the course of the study, the authors evaluated microcirculatory disorders according to the method by V.I. Kozlov, G.A. Azizov, and O.A. Gurova. The index of conjunctival microcirculation (ICM) was calculated, giving a summary characteristic of all the observed changes in the microcirculation system. Patients with local inflammatory conditions of the organs of vision affecting regional microcirculation were excluded from the study.

In view of the effect of persistent pain syndrome in chronic dorsalgia on the social activity of patients and on their emotional state, the authors investigated the psychoemotional status of the patients and the dynamics of indices of well-being, activity, mood and quality of life before and after treatment.

Results and Discussion

The main effectiveness criterion for the therapy carried out in the control and main groups was the dynamics of persistent pain indicators in chronic dorsalgia, since the present study aimed to find effective and least expensive methods of therapy and rehabilitation of this pathology.

Since the results of Australian scientists show that a clinically oriented pain module can increase knowledge of the neurophysiology of pain [41], to objectify pain, the authors of the present research analyzed possible options for studying pain before and after treatment. It was taken into account that changing the patient's attitudes and beliefs about pain leads to improvement of treatment of chronic pain and perception of pain as less significant; this allows the patient to improve their global impression of the treatment effectiveness [31].

Since the subjective perceptions of pain can differ and be interpreted in various ways, the authors of the present study used VAS suggested in 1974 by E.C. Huskisson, which largely contains a number of clear criteria for pain.

VAS was used in the present study to calculate the indices of the severity of pain and to assess its dynamics.

Assessment of the pain level according to VAS was carried out on the 7th, 14th, 28th and 42nd days of treatment. Figure 1 shows the dynamics of indices in the main and control groups.

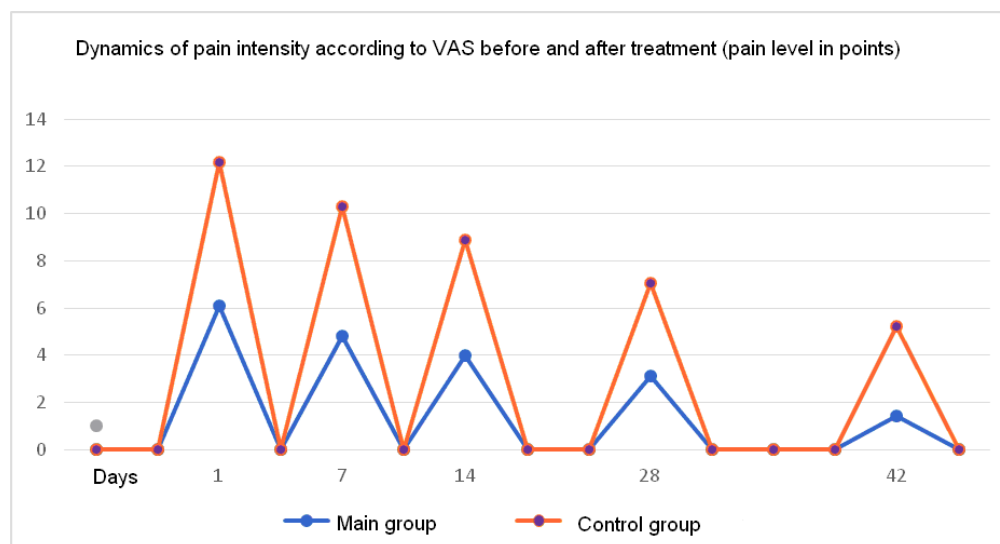


Figure 1. Dynamics of pain intensity according to VAS before and after treatment

The authors found that the level of pain in the control group began to decrease significantly ($p < 0.05$) by the 14th day of treatment, reached the maximum decrease by the 28th and changed less intensively thereafter.

In the main group (where osteopathic techniques were used), the pain levels in patients began to decrease earlier than in patients without the use of osteopathic methods (by the 7th day from the start of treatment), and continued to progressively decrease throughout the course of treatment.

By the end of the course of treatment, the level of pain in the main group was significantly lower ($p < 0.05$) than in the control group.

The data obtained on a two-time faster decrease of pain in the main group proves that the use of osteopathic methods in the complex treatment and rehabilitation of patients with persistent pain syndrome in chronic dorsalgia can be considered reasonable and effective therapy that reduces pain faster.

To obtain comprehensive information about the patient's pain, during the study, the McGill pain inventory that determines pain by many factors. It includes sensory, emotional and evaluative aspects, a digital scale of pain intensity, a set of descriptor words and a description of pain. The results are shown in Table 1.

Table 1. Dynamics of the pain index and the results of the McGill inventory (in points)

Indices Groups	Number of Selected Definitions- Descriptors Index total		Pain Rank Index total		Pain index	
	Before treatme nt	After treatment	Before treatment	After treatment	Before treatment	After treatment
Main	8.12+1.6 6	3.06+1.38* #	16.06+3.1 3	4.76+2.49* #	18.09+4.7 9	1.52+1.29* #

Control	8.20+1.4 8	5.43+1.48*	16.03+2.7 4	10.08+2.74 *	18.13+5.5 0	5.4+3.56*
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* indices are significantly different compared to baseline (p <0.05)

indices of the main group significantly differ from those of the control group (p <0.05)

According to the McGill inventory, the results of the study showed a significant difference in the dynamics of the pain rank index and the number of selected definitions-descriptors index in the main and control groups (p <0.05). The pain rank index values significantly decreased in the main and control groups, and the main group dynamics was much more pronounced (p <0.05).

The data obtained on the rank index of pain (which is a good marker of the patient's pain sensations) indicated a more pronounced positive effect when using osteopathic techniques in the complex treatment and rehabilitation of patients with persistent pain syndrome in chronic dorsalgia.

Considering that microcirculation disorder is one of the important pathogenetic factors on which the terms of treatment and recovery of the patient depend (as well as the risk of serious complications in patients with diseases of the musculoskeletal system), during the study, special attention was paid to the restoration of the microvasculature. The authors analyzed microcirculation indices from the standpoint of the integrity of the human body.

Since the eye is the only organ which anatomical and physiological features allow direct research methods in the microvascular bed in experiments and treatment, the state of individual areas of the microvasculature can be used to judge an integral microcirculation system [24, 49].

During the study, the authors determined the indices of conjunctival microcirculation before and after treatment in both groups of patients. The data obtained are presented in Table 2.

Table 2. Dynamics of microcirculation indices in the eyeball conjunctiva

Conjunctival microcirculation index (conventional unit)	Main group	Control group
before treatment	0.51+0.03	0.50+0.03
after treatment	0.28+0.02*#	0.38+0.03*

* indices are significantly different compared to baseline (p <0.05)

indices of the main group significantly differ from those of the control group (p <0.05)

The dynamics of microcirculation indices in the conjunctiva of the eyeball during repeated examination after the course of treatment in the main and control groups testified to positive changes, and in the patients of the main group, where osteopathy was used, the positive dynamics of indices was significantly higher (p <0.05).

The authors also found that in a number of cases, structural changes in the microvessels of the eyeball in patients remained, but at the same time there was a decrease in the degree of vasodilation of the postcapillary bed, which allows speaking of a decrease in the degree of congestion and a less pronounced slowdown in blood flow and permeability of the vascular wall.

Data on microcirculation disorders in the conjunctiva of the eyeball before and after treatment in

the main and control groups indicated that the structure of positive changes during biomicroscopy differed in the main and control groups. In the control group, microcirculation improved mainly due to rheological changes in the blood (36%), structural changes in microvessels (26%), the proportion of changes in hemodynamics and changes in barrier function – 25% and 13%, respectively.

In the main group, the positive effects on hemodynamics increased noticeably (32%), mainly due to elimination of arteriole spasm.

A comparative analysis of changes in microcirculation in both groups of patients revealed that in the main group there was a significantly higher percentage of improvement in hemodynamics due to a decrease in the severity of arteriole spasm and an increase in the number of functioning capillaries; the arterio-venular ratio of diameters tended to normalize.

During the study, the authors paid attention to the fact that patients with persistent pain syndrome have an increased level of anxiety about their health status and the outcome of the disease. For this purpose, STAI was carried out using a inventory, which allows assessing the level of the patient's nervous tension and, in particular, the level of emotional stress that arose against the background of pain. The data are presented in Table 3.

Table 3. Dynamics of indices of STAI

Indices Groups	Before treatment		After treatment	
	RA	PA	RA	PA
Main (n=85)	42.4+7.3	51.7+7.8	31.7+6.1*#	48.8+9.3
Control (n=30)	42.3+6.6	51.5+7.1	36.9+6.1*	48.6+6.8

* indices are authentically different compared to baseline (p <0.05)

indices of the main group authentically differ from those of the control group (p <0.05)

According to the study using STAI, in both groups after treatment the severity of anxiety affect decreased, and in the main group the decrease in reactive anxiety (RA) indices was more significant (by 25.24%) compared with the control group where this indicator decreased by 12.77% (p <0.05). At the same time, the level of personal anxiety (PA) in both groups decreased.

Since the studied patients had persistent pain for a long time, were in a pessimistic mood and displayed a pronounced decrease in social activity, during the study the authors applied a comprehensive approach to the patient's personality as a whole and to the result of their 'bodily-emotional release' [67].

Research conducted at the University of Victoria Osteopathy Clinic (Melbourne, Australia) shows that pain severity and health conditions can be used in musculoskeletal treatment to study associations with life satisfaction and mental health; the present study paid attention to the indices of well-being, activity and mood as the fundamental psycho-emotional factors in patients with persistent myofascial syndrome, affecting mental health and the quality of life in general [8, 11, 13, 21, 69].

The study of well-being, activity and mood allowed identifying an improvement in the above

indices. The data are presented in Table 4.

Table 4. Dynamics of indices of well-being, activity and mood

Indices Groups	Before treatment			After treatment		
	WB	A	M	WB	A	M
Main (n=85)	2.0+0.46	2.4+0.55	3.1+0.92	4.1+0.46*#	4.2+0.55*#	4.3+0.83*#
Control (n=30)	2.0+0.59	2.4+0.71	3.0+0.34	3.0+0.59*	3.1+0.59*	3.4+0.71

* indices are authentically different compared to baseline (p <0.05)

indices of the main group authentically differ from those of the control group (p <0.05)

The data obtained on well-being, activity and mood of patients in the main and control groups testified to the improvement of these indices, with numbers in the main group significantly higher.

Persistent pain syndrome is undoubtedly a constantly present stress factor and, accordingly, has a destructive and exhausting character typical of distress; therefore, the study looked into the dynamics of the Positive Distress Symptomatical Index (PDSI) in the control and main groups.

When investigating the severity of distress, the authors used a clinical test screening technique designed to assess the patterns of psychological signs in patients with persistent pain syndrome – the symptomatic questionnaire SCL-90-R (Symptom Check List-90-Revised). The data obtained are presented in Table 5.

Table 5. SCL-90 indices dynamics

Groups Scales	Before treatment		After treatment	
	Main	Control	Main	Control
GSI (norm up to 0.51)	1.08+0.37	1.08+0.35	0.63+0.28*#	0.81+0.24*
PSI (norm up to 21.39)	55.9+10.7	56.8+9.7	42.1+10.1*	49.7+9.5*
PDSI (norm up to 1.17)	1.68+0.46	1.68+0.3	1.32+0.18*#	1.43+0.24*

* indices are authentically different compared to baseline (p <0.05)

indices of the main group authentically differ from those of the control group (p <0.05)

During the study, the patients of the main group showed a significantly more pronounced regression of psychoemotional disorders, and PDSI decreased.

The patients with chronic dorsalgia, studied by the authors, had a persistent pain syndrome, which contributes to the limitation of physical and social activity and, as a result, affects the quality of life. The authors measured the relationship between the health status of patients with their quality of life.

For the study, MOS SF-36 (Medical Outcomes Study-Short Form 36 Health Survey) was used to quantify the physical, emotional and social components of the quality of life, as well as additionally determine the intensity of the pain that occurs. The data obtained are presented in Table 6.

Table 6. MOS SF-36 dynamics of the indices if quality of life

Indices \ Group	Before treatment, %		After treatment, %	
	Main	Control	Main	Control
PF	45.7+1.2 7	44.3+1.88	0.3+0.97*#	64.2+1.3*
RP	3.2+2.23	32.5+3.8	67.6+1.6*#	1.7+3.16*
BP	36.7+1.5	35.8+2.3	79.6+1.37*#	54.2+2.26*
GH	29.5+1.2 4	30.3+1.82	3.7+1.06*#	46.1+1.32*
VT	5.7+1.91	34.7+2.87	9.2+1.74*#	44.5+2.46*
SF	6.9+2.47	45.9+3.9	9.6+1.96*#	55.2+3.3*
RE	4.0+2.96	33.2+5.05	1.2+2.85*#	44.4+4.67*
MH	0.0+1.87	38.7+3.03	2.5+1.54*#	53.1+2.57*

* indices are authentically different compared to baseline ($p < 0.05$)

indices of the main group authentically differ from those of the control group ($p < 0.05$)

The data obtained showed that the quality of life indices improved in the main group by an average of 30.25%, and in the control group by an average of 14.75%, which was a statistically significant difference ($p < 0.05$).

Against the background of a decrease in the severity of pain syndrome, there was an improvement in the state of cerebral hemodynamics, normalization of the psychoemotional state of patients, while the patients of the main group even noted a significant improvement in their quality of life.

The data of the present study confirmed the main hypothesis that osteopathic correction increases the effectiveness of complex treatment for chronic pain and significantly improves the functional state of the patient [2, 39, 47, 51, 52, 65].

The use of osteopathic methods in the complex treatment and rehabilitation of patients with persistent pain syndrome in chronic dorsalgia significantly increases the effectiveness of therapeutic and rehabilitation measures and does not require additional funding and economic costs.

The research confirmed that treatment with the use of combined osteopathic methods aimed to activate antinociceptive systems and correct peripheral sources of pain, leads to a more rapid change in the nature of pain and a decrease in its intensity, and to an improvement in hemodynamics [15], as well as to improve the general health of patients and their psychoemotional status, and as a result, to return them to the socially active lifestyle. The study clearly noted that complementary and alternative medical therapies have an undeniable positive effect on the mental health of patients, which was confirmed by the data reflected in 2018 in the work by Sharon Freeman Clevenger in the United States [59], to date, such methods of treatment undoubtedly include osteopathy. At the same time (as in studies containing experience in treating New Zealand patients with osteopathy), a predominantly positive perception of osteopathic treatment [58] was noted, which (in the complex treatment and rehabilitation of patients with

persistent pain syndrome in chronic dorsalgia) improves the quality of life due to improving well-being, activity and mood, as well as reduces the level of distress, feelings and personal anxiety.

Notably, strict adherence to the indications and contraindications of osteopathy allows reducing the duration of treatment and avoiding negative consequences and complications, and at the same time reducing the direct and indirect costs of treating patients with chronic dorsopathies.

All of the above allows determining the undoubted expediency and effectiveness of osteopathic techniques in therapy and medical rehabilitation of patients with persistent pain syndrome in pathology of the musculoskeletal system. This provision, based on the results of the study, once again confirms the experts' recommendations to consider manual intervention as an important component of the treatment of chronic pain, noted in the international and Russian "General principles for the treatment of musculoskeletal pain."

Conclusion

The results of the study allows stating that osteopathy undoubtedly takes an important place in the complex treatment and rehabilitation of patients with persistent pain syndrome in chronic dorsalgia, and the effectiveness of osteopathic techniques is obvious.

The proposed combined method of treatment and rehabilitation can be successfully applied to improve medical care provided to persons with persistent pain syndrome in chronic dorsalgia in order to quickly relieve pain syndrome, improve psychoemotional status and the quality of life.

It is expedient to include osteopathy in the complex measures specified in the international and Russian 'General principles for the treatment of musculoskeletal pain'.

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